

## PART 52, ENVIRONMENTAL QUALIFICATION (EQ) UNDER 10 CFR 50.49

PROGRAM APPLICABILITY: 2504

### 51080-01 INSPECTION OBJECTIVES

To review the licensee's equipment qualification program for electrical, and instrumentation and control (I&C) equipment that is important to safety for meeting the requirements of 10 CFR 50.49.

To review the licensee's implementation of an equipment qualification program for maintaining the qualified status of equipment during the life of the plant, as required by 10 CFR 50.49.

To perform an inspection of the equipment qualification documentation files thereby verifying that electric equipment important to safety meets the requirements of 10 CFR 50.49(j).

To perform a physical inspection of equipment within the scope of 10 CFR 50.49, to determine that the installed equipment meets the qualification requirements.

### 51080-02 INSPECTION REQUIREMENTS AND GUIDANCE

02.01 Team Members and Responsibilities. A team of headquarters and regional personnel should be assigned to perform this onsite inspection. The following defines the nominal team composition and their responsibilities:

- a. Team Leader - A regionally based inspector to lead discussions with the licensee, to conduct entrance and exit interviews, to coordinate team activities and participate in the inspection activities.
- b. Technical Specialist(s) - Knowledgeable of the application and operation of electrical, interfacing mechanical, I&C equipment requiring environmental qualification in the harsh environment.
- c. Quality Assurance Specialist - Knowledgeable of quality assurance (QA) for procurement, maintenance, and testing of the electrical equipment requiring environmental qualification in a harsh environment.
- d. Environmental Qualification Specialist(s) - Knowledgeable of the 10 CFR 50.49 requirements of equipment qualification testing and analysis and requirements for documenting qualification results.

02.02 Pre-Inspection Tasks. Prior to the onsite inspection, the following tasks should be completed:

- a. Inspectors should obtain and review those portions of Section 3.11, Environmental Qualification of Mechanical and Electrical Equipment, of the NRC Final Safety Evaluation Report(s) applicable to 10 CFR 50.49.
- b. Review of the Equipment Qualification Master List (EQML) requiring environmental qualification.
- c. From the EQML, select a representative sample size of items. The inspection will include evaluation of qualification documentation and visual inspection of these items. The list of selected items should contain as many different types of equipment as possible. The selection process should consider the safety significance of the equipment items based on Probabilistic Risk Assessment (PRA) ranking of the licensee's design.
- d. The responsibility for the main segments of the inspection should be divided among the team members before the inspection. Comparison and correlation of information discovered during the inspection by the team members is important.
- e. Approximately three weeks prior to the inspection, the following items should be reviewed with the licensee:
  1. Scope of the equipment qualification inspection.
  2. Documents to be made available during the inspection to include the licensee's Section 3.11 of the FSAR, Environmental Qualification (EQ) Program, Site-Specific EQ Equipment List, System Component Evaluation Worksheets (SCEW), also known as Environmental Qualification Data Packages (EQDP) and other pertinent qualification documentation files.
  3. Advance copies of the licensee's procedures applicable to equipment qualification which include the EQ program, procurement of qualified equipment, maintenance of qualified equipment, and any modifications to the plant that could affect qualified equipment.
  4. Entrance meeting presentation by the licensee covering the organization chart with EQ applicability, an overview of the EQ program, and an overview of EQ documentation file organization.
  5. Advance arrangements for plant walkdown to avoid unnecessary delays.
  6. Other logistics matters (including security) as appropriate.

02.03 Inspection Tasks. The onsite inspection will consist of the following tasks:

- a. If possible, request that the licensee give a presentation to describe its organization, EQ program and the status of program implementation.
- b. The procedural and programmatic inspection tasks will include the following:
  1. Review the licensee's procedures to determine that a program has been implemented to generate, maintain, and distribute the list of equipment requiring qualification in accordance with the requirements of 10 CFR 50.49.
  2. Review program documentation to determine that the licensee has implemented procedures for review and approval of EQ documentation and for establishing equipment qualification.
  3. Review selected maintenance and/or surveillance procedures to determine that EQ requirements have been incorporated.
  4. Determine that the procedures for procurement of replacement and spare equipment addresses EQ requirements and that they require qualification of the equipment to be established before use in the plant. Review selected procurement documents to determine that EQ requirements have been met.
  5. Determine that the procedures for control of plant modifications include evaluations of the effect of the modification on qualified equipment (e.g., the modification requires equipment to be re-qualified or the modification changes the environment of qualified equipment).
  6. Determine by interviewing licensee personnel performing work involving qualified equipment that they are aware of EQ requirements and procedures. Determine that personnel performing review and approval of qualification documentation have appropriate training and experience.
  7. Determine that the licensee has established and implemented a mechanism for addressing NRC Generic Communications relating to equipment requiring qualification under 10 CFR 50.49.
  8. Review licensee QA/QC audit records for evidence of conformance to procedure requirements.
- c. The EQ documentation file inspection will include the following:
  1. Review the completeness of the licensee's list of equipment requiring qualification by determining that the list includes the equipment listed in the licensee emergency procedures and required by RG 1.97.
  2. Review the qualification files for the samples selected to determine if they contain the qualification specification for the equipment, adequate documentation of the qualification of the equipment, and a positive statement

that the documentation has been reviewed and approved and the equipment determined to be qualified for its application. The review should determine that the important qualification requirements have been addressed in the qualification files. A checklist that can be used as a guide for the reviews of the qualification files is contained in Appendix A.

3. Review the qualification documentation files to determine that the licensee has demonstrated that the installed devices are the same or similar devices that were qualified (i.e., type tested).
  4. Obtain the equipment descriptions, model and serial number, and plant ID for use in the physical inspection (equipment walkdown). Determine any special requirements for device orientation, connections, housing seals, etc. required by the EQ documentation. (Appendix B contains checklists for several standard pieces of equipment).
- d. The physical inspection (equipment walkdown) will consist of the following tasks:
1. At the beginning of the inspection, discuss the accessibility of the devices to be inspected with the licensee. Modify the list as appropriate with proper justification.
  2. Through use of the equipment checklists contained in Appendix B, determine if the installed equipment is the same as that described in the licensee's documentation and that the equipment is properly installed and maintained. The team member responsible for reviewing the documentation for an equipment item should also perform the physical inspection.
  3. Determine if the equipment surrounding where the device being inspected may fail in a manner that could prevent the device from performing its safety function. Any condition that could adversely affect the safety function of equipment being inspected should be noted for discussion with the licensee.

#### 51080-03 RESOURCE ESTIMATE

The average time needed to complete the onsite EQ inspection is estimated to be one week. In addition to the team leader, approximately 6 to 8 additional technical specialists will be required to assist in the inspection. The resource estimate for this inspection procedure is approximately 360 hours of direct inspection effort.

#### 51080-04 REFERENCES

10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants."

NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Equipment," Revision 1, July 1981.

Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," Revision 1, June 1984.

Regulatory Guide 1.97, "Instrumentation for Light Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3, May 1983.

Regulatory Guide 1.97, "Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants." Revision 4, June 2006.

SECY-05-0197, "Review of Operational Programs in a Combined License Application and Generic Emergency Planning Inspections, Tests, Analyses, and Acceptance Criteria."

IEEE Std 323-1974, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations."

Licensee's EQ Master List (EQML) of Equipment Requiring Qualification to 10 CFR 50.49.

Licensee's System Component Evaluation Worksheets (SCEW) for EQ.

Licensee's Procedures for EQ Program, Procurement of Qualified Equipment, Maintenance of Qualified Equipment, and Maintenance to Plant that could affect qualified equipment.

Licensee's Qualification Documentation and/or Files (e.g., EQDP).

#### 51080-07 PROCEDURE COMPLETION

The goal of this inspection is to review the representative sample size chosen from the EQML; if fewer samples are available, then all available samples should be reviewed. However, if fewer samples than these goals are reviewed, but the inspectors feel that the quality of the samples reviewed is high and there are no significant findings, the intent of this Inspection Procedure has been met.

This procedure is complete upon satisfactory inspection results verifying that an EQ program exists that adequately implements and documents the EQ program as described in the FSAR.

END

## APPENDIX A

### CHECKLIST FOR REVIEW OF LICENSEE EQ DOCUMENTATION FILES

This checklist is provided for use in performing evaluations of the adequacy of a qualification documentation package for a piece of equipment qualified to the requirements of 10 CFR 50.49(j).

Such reviews by the inspection team will determine the adequacy of the EQ program for the device and will determine the adequacy of the licensee's review and approval process for the equipment. **Perform a complete review for one EQ file.** For other files, items not reviewed should be marked "N/A" in the 'Comments Column.'

Plant/Docket No.: \_\_\_\_\_ Reviewer: \_\_\_\_\_

Component(s): \_\_\_\_\_

Equipment Documentation File: \_\_\_\_\_

#### Covered in EQ Documentation

<u>EQ Issue</u>	<u>Yes</u>	<u>No</u>	<u>Comments</u>
1. Definitive documentation provided by the licensee that the equipment is qualified for its application.	___	___	
2. Technical description of the equipment.	___	___	
3. If qualification sample is not identical to the installed devices, a documented engineering analysis has been provided.	___	___	
4. Required mounting methods and orientations.	___	___	
5. Delineated Interfaces - conduit, housing, seal, etc.	___	___	
6. A documented qualified life has been established based on accelerated aging - thermal, radiation, cyclic, as appropriate.	___	___	

Component(s): \_\_\_\_\_

Covered In  
EQ Documentation

<u>EQ Issue</u>	<u>Yes</u>	<u>No</u>	<u>Comments</u>
7. All type tests performed on the same test specimen.	___	___	
8. Performance/acceptance criteria (operating time, transmitter accuracy, etc. as applicable to component).	___	___	
9. Documented test sequence conforms to IEEE 323-1974 or justification for non-conformance has been provided.	___	___	
10. Radiation levels and exposure times cover accident and normal service.	___	___	
11. DBE exposure simulation meets plant requirements:	___	___	
Steam Exposure	___	___	
Temperature	___	___	
Pressure	___	___	
Humidity	___	___	
12. Chemical or water spray testing performed when required.	___	___	
13. Suggested margins according to IEEE Std 323.	___	___	
14. Submergence test (if required).	___	___	
15. Test anomalies properly documented and resolved.	___	___	
16. Applicable Installations, etc. resolved.	___	___	
17. Maintenance/Surveillance Criteria and Qualified Life Defined.	___	___	
18. References clearly identified and attached or retrievable (including I.D. of plant equipment).	___	___	

## APPENDIX B

### PHYSICAL INSPECTION CHECKLISTS

This appendix contains checklists for use in physical inspection of environmentally qualified equipment. Prior to the physical inspection, checklists should be prepared for each device that is to be inspected. The blank spaces in the “Documented Information” section of the checklist should be completed from the information in the licensee’s documentation files relating to the device. Alternatively, SCEW sheets, may be used in lieu of completing some of the check sheet spaces. During the physical inspection, the as “Installed Condition” should be compared with the “Documented Information.” Agreement between the “As Installed” Condition and “as “Documented” Information” should be marked in the “Yes” column. A disagreement should be marked with a “No” and a description of the nature of the disagreement placed in the “Comments” column. A space is provided for general comments at the bottom of the checklist.

Checklists are provided for the following equipment on the licensee’s EQML:

- Pressure transmitters (also to be used for level and flow transmitters)
- Motor Operated Valves
- Limit Switches
- Solenoid Operated Valves
- Electric Motors
- Cables including consideration of submerged cables in buried and below grade cable vaults

A General Form (EQUIPMENT DESCRIPTION) is provided for other devices such as:

- Switchgear
- Motor Control Centers
- Logic Equipment
- Diesel Generator Control Equipment
- Sensors (pressure, pressure differential, temperature, and neutron).
- Limit Switches
- Heaters
- Fans
- Control Boards
- Instrument Racks and Panels
- Electrical Penetrations
- Connectors
- Splices
- Terminal Blocks
- EQ taped and Raychem splices



## PRESSURE TRANSMITTER PHYSICAL INSPECTION CHECKLIST

Component ID No.: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented Information</u>	<u>Installed Condition</u> <u>Agrees with Documented</u>		<u>Comments</u>
	<u>Yes</u>	<u>No</u>	
1. Location Bldg. _____ Room _____ Elev _____	_____	_____	
2. Manufacturer _____	_____	_____	
3. a. Model No. _____	_____	_____	
b. Range/Type Code _____	_____	_____	
c. Serial No. _____	_____	_____	
4. Mounting Description _____ _____	_____	_____	
5. Orientation _____ _____	_____	_____	
6. Process Connection Type _____ _____	_____	_____	
7. Electrical Connection Type _____ _____	_____	_____	
8. Housing Seals in good condition, covers in place	_____	_____	
9. Does installed device experience a significant temperature rise from process or accident conditions? (If yes, review documentation to determine whether considered)	_____	_____	
10. Ambient Normal Expected Temperature Range _____ (If ambient temperature exceeds normal expected, verify that licensee has considered the elevated temperature in the qualified life evaluation)	_____	_____	

General Comments on Physical Inspection:

# MOTORIZED VALVE ACTUATOR PHYSICAL INSPECTION CHECKLIST

Component ID: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented Information</u>	<u>Installed Condition</u>		<u>Comments</u>
	<u>Agrees</u>	<u>With Documented</u>	
	<u>Yes</u>	<u>No</u>	
1. Location Bldg. ____ Room ____ Elev ____	____	____	
2. Manufacturer _____	____	____	
3. a. Model No. _____	____	____	
b. Serial No. _____	____	____	
4. Mounting Description _____ _____	____	____	
5. Orientation _____ _____	____	____	
6. Housing seals in Good Condition, Covers in Place,	____	____	
7. Housing and Motor Drains _____	____	____	
8. Does Installed Device Have a Brake? (If yes, verify status qualification)	____	____	
9. Conduit Seals _____	____	____	
10. Ambient Normal Expected Temperature Range _____ (If ambient temperature exceeds normal expected conditions, verify that licensee has considered the elevated temperature in the qualified life evaluation)	____	____	

General Comments on Physical Inspection:

## LIMIT SWITCH PHYSICAL INSPECTION CHECKLIST

Component ID: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented Information</u>	<u>Installed Condition</u>		<u>Comments</u>
	<u>Yes</u>	<u>No</u>	
1. Location Bldg _____ Room _____ Elev _____	_____	_____	
2. Manufacturer _____	_____	_____	
3. Model No. _____	_____	_____	
4. Mounting Description _____ _____	_____	_____	
5. Orientation _____ _____	_____	_____	
6. Electrical Connection Type _____	_____	_____	
7. Housing seals in Good Condition	_____	_____	
8. Ambient Normal Expected Temperature Range _____ (If ambient temperature exceeds normal expected conditions, verify that licensee has considered the elevated temperature in the qualified life evaluation)	_____	_____	

General Comments on Physical Inspection:

# SOLENOID OPERATED VALVE PHYSICAL INSPECTION CHECKLIST

Component ID: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented Information</u>	<u>Installed Condition</u>		<u>Comments</u>
	<u>Agrees with Documented</u>		
	<u>Yes</u>	<u>No</u>	
1. Location Bldg _____ Room _____ Elev _____	___	___	
2. Manufacturer _____	___	___	
3. a. Model No. _____	___	___	
b. Voltage _____	___	___	
c. Configuration _____	___	___	
4. Mounting Description _____ _____	___	___	
5. Orientation _____ _____	___	___	
6. Process Connection Type _____ _____	___	___	
7. Electrical Connection Type _____ _____	___	___	
8. Housing seals in Good Condition	___	___	
9. Does Installed Device Experience a Significant temperature rise from process? (If yes, documentation must be reviewed to determine if the temperature was considered.)	___	___	
10. Ambient Normal Expected Temperature Range _____ (If ambient temperature exceeds normal expected conditions, verify that the licensee has considered the elevated temperature in the qualified life evaluation.)	___	___	

General Comments on Physical Inspection:

# ELECTRIC MOTOR PHYSICAL INSPECTION CHECKLIST

Component ID: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented information</u>	<u>Installed Condition</u> <u>Agrees with Documented</u>		<u>Comments</u>
	<u>Yes</u>	<u>No</u>	
1. Location Bldg _____ Room _____ Elev _____	_____	_____	
2. Manufacturer _____	_____	_____	
3. a. Model No. _____	_____	_____	
b. Serial No. _____	_____	_____	
c. Voltage _____ HP _____	_____	_____	
4. Mounting and Orientation _____	_____	_____	
5. Accessories _____	_____	_____	
Coolers _____	_____	_____	
Lubricant Reservoirs _____	_____	_____	
Heaters _____	_____	_____	
6. Housing Seals and Covers in Place and Tight	_____	_____	
7. Area Surrounding Motor is Clean and Dry	_____	_____	
8. Ambient Normal Expected Temperature Range _____	_____	_____	
9. a. Junction Box Type _____	_____	_____	
_____	_____	_____	
b. Drainage Method _____	_____	_____	
_____	_____	_____	
General Comments on Physical Inspection:			

## CABLE PHYSICAL INSPECTION CHECKLIST

Component ID: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented Information</u>	<u>Installed Condition</u> <u>Agrees with Documented</u>		<u>Comments</u>
	<u>Yes</u>	<u>No</u>	
1. Location Bldg. _____ Room _____ Elev _____	_____	_____	
2. a. Manufacturer _____	_____	_____	
b. Model No. _____	_____	_____	
c. Batch No. _____	_____	_____	
3. a. Insulation Type _____	_____	_____	
b. Jacket Type _____	_____	_____	
c. Number of Conductors _____	_____	_____	
d. Conductor Size _____	_____	_____	
e. Shield Configuration _____ _____	_____	_____	
4. Voltage Rating _____	_____	_____	
5. Ambient Normal Expected Temperature Range _____	_____	_____	
6. General Condition of Installed Cable	<u>None</u>	<u>Some</u>	
a. Obvious signs of mistreatment	_____	_____	
b. Obvious surface flaws	_____	_____	
c. Obvious flaws on conductor insulation at terminations	_____	_____	

General Comments on Physical Inspection:

## EQUIPMENT DESCRIPTION

Component ID: \_\_\_\_\_ Reviewer: \_\_\_\_\_

<u>Documented Information</u>	<u>Installed Condition</u> <u>Agrees with Documented</u>		<u>Comments</u>
	<u>Yes</u>	<u>No</u>	
1. Location Bldg _____ Room _____ Elev _____	_____	_____	
2. Manufacturer _____	_____	_____	
3. a. Model No. _____	_____	_____	
b. Serial No. _____	_____	_____	
4. Mounting Description _____ _____	_____	_____	
5. Orientation _____ _____	_____	_____	
6. Process Connection Type _____	_____	_____	
7. Electrical Connection Type _____	_____	_____	
8. Housing Seals in Good Condition, Covers in Place	_____	_____	
9. Does Installed Device Experience a Significant Temperature Rise (If yes, documentation must be reviewed to determine if the temperature rise was considered.)	_____	_____	
10. Ambient Normal Expected Temperature Range _____ (If ambient temperature exceeds normal expected conditions, verify that the licensee has considered the elevated temperature in the qualified life evaluation.)	_____	_____	

General Comments on Physical Inspection:

Attachment 1

Revision History for IP 51080

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	11/07/11 CN 11-029 ML112620648	Initial issue to support inspections of construction programs described in IMC 2504, Construction Inspection Program: Inspection of Construction and Operational Programs.  Completed 4 year search of historical CNs and found no commitments related to this Inspection Procedure.	None	N/A	N/A